REMARKS

New claims 10-22 have been added to claim the invention as an apparatus. Support for these claims may be found at pages 10-12 of the specification and in Fig. 3.

Allowable Subject Matter

The Applicants thank the Examiner for indicating that claim 3 would be allowable if rewritten in independent form and amended to overcome the rejections under 35 U.S.C. § 112. Claim 3 has been has been amended to overcome the 35 U.S.C. § 112 rejections. Specifically, the wording "the second monitoring means" is now changed to "a second monitoring means" to establish proper antecedent basis for the "second monitoring means." In addition, claim 3 has been rewritten in independent form. Applicants respectfully believe that claim 3 is now in condition for allowance.

Claim Objections

At paragraph 2 of the Office Action, the Examiner has objected to claims 1-6 and 8-9 for numerous informalities. Applicants have amended claim 1 to incorporate the Examiner's suggestion to change "the subscriber" to "the subscriber unit." In claim 3, the Examiner has suggested several changes with regards to wording the claim's preamble. As noted above, Applicants have rewritten claim 3 in independent form and thus have incorporated a different preamble. Thus, Applicants believe the Examiner's suggestions to change claim 3 need not be incorporated. Applicants have amended claim 4 to incorporate the Examiner's suggestion to change "a succession" to "the succession."

The Examiner has suggested inserting the words "the sequence number of" in claims 1, 3, 4 and 6-9 before the words "the corresponding byte." Applicants have not incorporated this suggestion as Applicants believe that this change is not necessary to distinguish these claims from the prior art.

The Examiner has suggested changing the words "A system" to "The system" in claims 2 and 3 and "A gateway" to "The gateway" in claim 5. The following quote is from 35 U.S.C. § 282:

> "Each claim of a patent (whether in independent, dependent, or multiple dependent form) shall be presumed valid independently of the validity of other claims..."

In other words, each claim carries an independent presumption of validity and stands or falls on its own. See *Continental Can Company USA, Inc. v. Monsanto Co.*, 948 F.2d 1264, 1266-67, 20 USPQ2d 1746, 1748 (Fed. Cir. 1991). Applicants respectfully submit that using the article "A" instead of the article "The" is appropriate for the dependent claims as each dependent claim stands and falls independent of any independent claim it may make reference to. For example, claim 2 recites in relevant part "A system as defined in claim 1..." meaning that claim 2 is a system in and of itself that incorporates, by reference, all of the elements of claim 1. Thus while claim 2 covers a system that incorporates the elements of claim 1, claim 2 is entitled to be given legal significance regardless of whether claim 1 is at issue.

Furthermore, when claim 2 refers to the structure in claim 1 for the first time in its line 1, the article "A" is actually more appropriate than the article "The." See MPEP 608.01(n)(I)(A) which specifically allows using "A" for the introductory part of a dependent claim in the context of a multiple dependent claim, but the same principle applies here. Both "The..." and "A..." are suggested to be appropriate lead-in words for a dependent claim. See MPEP 2173.05(f). Neither form is indefinite merely because of the reference to another claim.

For these reasons, Applicants respectfully believe changing these claims to incorporate the Examiner's suggestions is not necessary.

Claim Rejections – 35 U.S.C. § 112

At paragraph 3 of the Office action, the Examiner has rejected claims 1-9 under 35 U.S.C. § 112 for lacking proper antecedent basis for certain claim terms. Appropriate corrections have been made in order to overcome these rejections. Specifically, the words "the corresponding byte" has been changed to "a corresponding byte" and the words "the receiving window" has been changed to "a receiving window" in claims 1, 4, and 6-9. In claim 2, the words "the first monitoring means" was changed to "a first monitoring means" and in claim 3, the words "the second monitoring means" was changed to "the second intercepting means" to reference the "second intercepting" means previously recited in the claim. For reasons set forth above, withdrawal of these rejections with respect to claims 1-9 is respectfully requested.

Claim Rejections - 35 U.S.C. § 103

At paragraph 6 of the Office action, the Examiner rejected claims 1, 2 and 4-9 under 35 U.S.C. § 103 as being unpatentable over U.S. Patent 6,601,101 to Lee et al. (hereinafter "Lee") in view of U.S. Patent 4,527,267 to Cohen (hereinafter "Cohen").

It is helpful to first review what the present invention is. The present invention relates to a technique for maintaining throughput of data packets between a server and an end user machine during handoff. According to an aspect of the present invention, first and second base stations are connected to the server. A Transmission Control Protocol (TCP) connection is established between the end user machine and the server using a wireless physical layer path between the first base station and the end user machine. The end user machine then generates acknowledgment signals in response to TCP packets received from the server. These acknowledgment signals are intercepted by a first gateway coupled to the first base station.

When a handoff is initiated from the first base station to the second base station, a subscriber unit associated with the end user machine signals the start of the handoff by issuing a first control signal to the gateway. The gateway responds to the first control signal by (i) generating a simulated acknowledgment signal that contains a window size of zero and (ii) forwarding the simulated acknowledgment signal to the server. This pauses the flow of TCP

packets (data) in the connection between the end user machine and the server (e.g., places the server into a TCP persist mode). The simulated acknowledgment signal takes the place of an original intercepted acknowledgment signal. After the handoff is complete, a gateway associated with the second base station forwards the original intercepted acknowledgment to the server to cause the flow of packets in the connection between the end user machine and the server to resume. Data transferred on the connection between the end user machine and the server can then travel over a second physical layer wireless path between the subscriber unit and the second base station.

Lee describes a technique for handing-off TCP sessions from one device to another in a manner that is transparent to a client. See Lee, Abstract. The handoff is accomplished using a modified version of TCP that incorporates specially defined logical indicators used in messages geared towards supporting a Transmission Control Handoff (TCH) session which is used to effectuate the handoff. The indicators include a SET indicator which indicates the message signals a start of a handoff, a HND indicator which indicates a message as being part of a TCH session and an END indicator which indicates the message signals an end of the handoff. See Lee, Col. 9, lines 1-40.

The TCH session is established between the first device and the second device by sending a message containing a SET indicator which forces a handoff. The TCH session is morphed into a TCP session by the second device using state information from the first device. The second device duplicates the original TCH session and terminates the original TCH session. The first device then terminates its participation in the TCP session with the client. The TCH session is considered morphed into the TCP session (i.e., the handoff is considered complete) when the first device has terminated its client session and the second device has terminated its TCH session. See Lee, Col. 9, lines 1-40, Col. 11, lines 34-46 and Fig. 5.

Lee notes that the END indicator serves to acknowledge the transfer of TCP state information. Lee further notes that the reason an END indicator is used as opposed to a standard TCP acknowledge (ACK) is because a distinction needs to be made between an acknowledgment

of the transfer of data and an acknowledgment of the transfer of TCP state information. Lee indicates that the END indicator is necessary as it may not be possible make this distinction in the context of the technique described by Lee. See Lee, Col. 10, lines 52-59.

Cohen describes a technique for serving a delivery confirmation or acknowledgment bit (D-bit) permission information for a given packet to a data terminal equipment's (DTE's) access protocol and a switching network's internal protocol. See Cohen, Col. 3, lines 1-9. A packet's D-bit indicates whether the packet is acknowledged either locally or end-to-end. See Cohen, Col. 2, lines 1-13.

D-bit permission information is stored in a two-sided memory table called a receive acknowledgment permission ("rack_perm") table. The rack_perm table keeps track of D-bit acknowledgment permissions for data packets received at an interface between the access protocol and the DTE. The content of the rack_perm table is used to determine if a particular packet is acknowledged or not depending on the D-bit associated with the packet. See Cohen, Col. 3, lines 27-33.

According to technique described by Cohen, when a packet with its D-bit value is received from a DTE by a packet switch in the switching network, the D-bit value associated with the packet is stored in the rack_perm table. The received packet is then transferred to the internal protocol for transmission to a destination DTE via the switching network. See Cohen, Col. 3, lines 50-57. The internal protocol then checks the rack_perm table for any permission to send an acknowledgment to the original DTE. Specifically, the internal protocol accesses the rack_perm table to determine a count of a number of acknowledgments that may be returned to the DTE. The count is then transferred to the access protocol which allows no acknowledgments if the count is zero or, if the count is greater than zero, acknowledges the outstanding packets. See Cohen, Col. 3, line 57 to Col. 4, line 6.

Representative claim 1 of the present invention recites:

1. In a system for interconnecting an end user machine with a server for the transmission of data:

first and second base stations connected to the server;

a subscriber unit connected to the end user machine and normally using ***a first wireless path*** with the first base station, the subscriber unit using ***a second wireless transmission path*** with the second base station when handed off from the first station to the second base station;

means associated with the subscriber unit for initiating a first control signal signifying the start of a handoff and a second control signal signifying the completion of the handoff;

means for establishing a single connection governed by TCP protocols between the end user machine and the server, each byte in a succession of data packets received from the server by the end user machine causing the generation of a first actual acknowledgment signal which contains a first portion indicative of a corresponding byte received by the end user machine and a second portion indicative of the size of a receiving window of the end user machine;

first intercepting means associated with the first base station for intercepting successive first actual acknowledgment signals;

means coupled to the first intercepting means and responsive to the first control signal for generating a first simulated ***acknowledgment signal*** whose first portion matches that of the then-intercepted first actual acknowledgment signal and whose ***second portion contains a value that indicates data transfer on the connection is paused***; and

means for applying the first simulated acknowledgment signal to the server.

Applicants respectfully submit that neither Lee nor Cohen taken either singly or in combination teach or suggest Applicants' claimed ***first wireless path*** between a first base station and a subscriber unit and ***a second wireless path*** between a second base station and the subscriber unit in combination with an ***acknowledgment signal*** sent over a wireless path that has a window size ***that indicates data transfer*** on a connection used to transfer data on a user machine and the server ***is paused***.

Both Lee and Cohen are silent with regards to having any wireless paths at all, never mind two active wireless paths. In fact, both Lee and Cohen seem to suggest wired connections only. According to Lee messages are transferred between devices via a bus or a fiber channel. See Lee, Col. 6, lines 51-56. This seems to suggest wired connections rather than wireless connections. Likewise, Cohen describes transmission lines (i.e., wired connections) used to

connect devices. See Cohen, Col. 4, line 62 to Col. 5, line 11 and Fig. 1. This too seems to suggest wired connections rather than wireless connections.

In addition, neither reference teaches or suggests sending an ***acknowledgement signal*** that has a window size ***that indicates data transfer on a connection is paused***. Lee describes using various logical indicators in a message that are a modification to the conventional TCP protocol to begin and end a handoff. See Lee, Col. 9, lines 23-40. The start of the handoff of a TCP session is signaled using a TCP packet containing a SET logical indicator. This causes the flow of packets on the TCP session to be paused until the handoff has completed. See Lee, Col. 9, lines 35-40 and Col. 13, lines 23-54. Thus, Lee does not need to send an acknowledgment signal with a window size indicating data transfer on the TCP session is paused because data transfer is paused using a logical indicator in a TCP packet instead. In addition, Lee teaches away from using acknowledgment signals as their use may not enable the distinction between acknowledging regular TCP data and TCP state information that is transferred as an integral part of Lee's handoff technique.

Cohen merely focuses on describing a technique for coordinating D-bit activity between an access protocol of data terminal equipment and an internal protocol of a transport switching network. The D-bit activity is used to determine whether an acknowledgment is sent or not. Nowhere does Cohen teach or suggest a technique for handling handoffs between wireless paths let alone sending an acknowledgment signal with a window size that indicates data transfer on a connection is paused.

Applicants' invention, on the other hand, deals with handling a TCP connection carried over wireless paths that is being handed off between two base stations. The invention uses standard protocol techniques (e.g., TCP persist mode) for pausing communication on e.g., a TCP connection while the handoff occurs, thus, not requiring changes to conventional protocols as suggested by Lee. In addition, the present invention intercepts acknowledgment signals and responds with an acknowledgment signal that causes data transfer on a connection, such as a TCP connection, to be paused in a conventional manner. Neither Cohen nor Lee teach or suggest

this. At best, Lee describes sending a TCP packet containing a logical indicator that causes data transfer to be paused on a connection and Cohen describes returning an acknowledgment signal locally. But, nowhere does Lee or Cohen teach or suggest using an acknowledgment signal containing a window size that indicates data transfer on a connection is paused, as claimed by Applicants.

For reasons set forth above, Applicants believe that Lee and Cohen taken either singly or in combination do not render claims 1, 2 and 4-9 unpatentable under 35 U.S.C. § 103. Therefore, Applicants respectfully request that the rejection be withdrawn.

CONCLUSION

In view of the above amendments and remarks, it is believed that all claims are in condition for allowance, and it is respectfully requested that the application be passed to issue. If the Examiner feels that a telephone conference would expedite prosecution of this case, the Examiner is invited to call the undersigned.

Respectfully submitted,

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